Homework 5

July 2, 2013

1 Pigeonhole Principle

Argue using the Pigeonhole principle that for sets A and B if $|A| > |B|$ then $\forall f \in$ Functions, $f : A \to B$, f cannot be injective.

2 Pigeonhole Principle and Hashing

How many words must be chosen (randomly from all possible words) to to be sure that at least two start with the same letter.

Describe how this relates to a Hashing function. Be sure to define what a hashing function is in your answer.

3 Bernoulli Trials

After years of driving through a particular intersection, you know that the probability of the light being red when you reach it is 0.27. You drive through the intersection twice a day, five times a week. What is the probability of being stopped by a red light five or more times?

4 Bayes' Rule

A murder has been committed. It is known that the individual who committed the crime is bald and a bald suspect is on trial. One percent of the population is bald.

Should the defence team tell the jury the probability of being bald given that the suspect is innocent or the probability that the suspect is innocent given that he is bald? Explain your answer using Bayes' rule.